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International Journal of Therapeutic Massage & Bodywork: Research, Education, & Practice

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Paper:

Bahrami, MScN, T., Rejeh, PhD, MScN, BScN, N., Heravi-Karimooi, PhD, MScN, BScN, M., Tadrissi, MScN, S. & Vaismoradi, PhD, MScN, BScN, M. (2019). The Effect of Foot Reflexology on Hospital Anxiety and Depression in Female Older Adults: a Randomized Controlled Trial. *International Journal of Therapeutic Massage & Bodywork: Research, Education, & Practice*, 12(3), 16-21.
<http://dx.doi.org/10.3822/ijtmb.v12i3.429>

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The Effect of Foot Reflexology on Hospital Anxiety and Depression in Female Older Adults: a Randomized Controlled Trial

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Background: Patients with cardiovascular diseases usually suffer from hospital anxiety and depression.

Aim: This study aimed to investigate the effect of foot reflexology massage on anxiety and depression in female older adults suffering from acute coronary syndrome.

Participants: Ninety older women with acute coronary syndrome were randomly assigned into intervention and control groups (n=45 in each group).

Research Design: A randomized controlled trial.

Intervention: The intervention and control groups received foot reflexology massage and routine care, respectively.

Main Outcomes Measures: The levels of anxiety and depression were evaluated using the hospital's anxiety and depression scale (HADS) before and immediately after foot reflexology massage.

Results: Foot reflexology massage reduced both anxiety ($F(1.44)=19.11, p = .001$) and depression ($F(1.44)=16.76, p = .001$) in acute coronary patients relative to control patients. The intervention had a large effect on hospital anxiety and depression.

Conclusions: Foot reflexology massage is an efficient and safe intervention for alleviating psychological responses among female older adults suffering from acute coronary syndrome during hospitalization.

KEY WORDS: acute coronary syndrome; anxiety; depression; hospital; reflexology

INTRODUCTION

Anxiety and depression are common psychological responses in patients with cardiovascular diseases during hospitalization.⁽¹⁾ It has been reported that 20% of these patients have the symptoms of anxiety and depression.^(2,3) Older people with acute coronary syndrome (ACS) often experience emotional problems that can influence their health status.⁽⁴⁻⁶⁾ Anxiety and depression in older people reduce their daily

performance and well-being.⁽⁷⁾ During hospitalization they may experience a higher rate of functional deterioration and reduced quality of life compared to younger patients.⁽⁸⁾

Massage therapy has been used as one part of complementary therapies for patients with different health conditions.⁽⁹⁾ Foot reflexology, as one type of massage therapy, stimulates specific reflex/reflexology areas on feet and can improve homeostasis.⁽¹⁰⁻¹³⁾ Reflex areas are the representative of different body organs that can be stimulated through neural pathways or hormone-like activities.⁽¹⁴⁾ The pressure applied in the reflexology massage intervention breaks down calcium crystals and uric acid in nerve pathways and causes psychological responses.^(15,16)

The effects of reflexology massage as a safe and non-invasive nursing intervention have been studied in different clinical situations. Therefore, the effects of reflexology massage on relieving anxiety and other physiological parameters,⁽¹⁷⁾ pain and fatigue,⁽¹⁸⁾ and stress⁽¹⁹⁾ have been shown. Soheili et al.⁽²⁰⁾ found a significant reduction in the severity of anxiety, stress, and depression after the use of reflexology massage. However, Gunnarsdottir and Jonsdottir's study⁽²¹⁾ did not support the effectiveness of reflexology massage for reducing anxiety.

The use of complementary and alternative therapies by older patients with heart diseases is increasing.⁽²²⁾ However, to the best of our knowledge, no study has been conducted to investigate the effect of foot reflexology massage on anxiety and depression among older adults in hospital settings. Therefore, the present study aimed to investigate the effect of foot reflexology massage on anxiety and depression in female older adults suffering from acute coronary syndrome.

METHODS

Hypothesis

Statistically significant differences are reported between intervention and control groups in terms

of hospital anxiety and depression after foot reflexology massage.

Design

This was a randomized controlled trial with a pre- and post-intervention design.

Participants

The study participants were 90 older people aged 60 years and over who were hospitalized for one day in the cardiac care unit (CCU), and were diagnosed with ACS. They were recruited using a convenience sampling method from a high-turnover CCU of a teaching hospital in Tehran, Iran. They were randomly assigned into either the intervention group or the control group ($n = 45$ in each group), with no patient declining to participate. Sampling was started sequentially from July 2014 to December 2015 and was continued until the required numbers of samples were recruited.

Eligibility criteria for the recruitment were: diagnosed with ACS consisting of angina pectoris and myocardia infraction by the cardiologist, aged 60 years old and older (the beginning of old age in developing countries), ability to understand and communicate in Farsi, no anxiolytics and sedative medications in the last four hours before the intervention, no alternative and complementary therapies during the last 48 hours before the intervention, and no foot ulcers and history of drug addiction.

Only female older people with ACS were recruited to eliminate the influence of gender on anxiety or depression. Exclusion criteria were the presence of hemodynamic instabilities during the intervention and unwillingness to collaborate with the intervention (Figure 1).

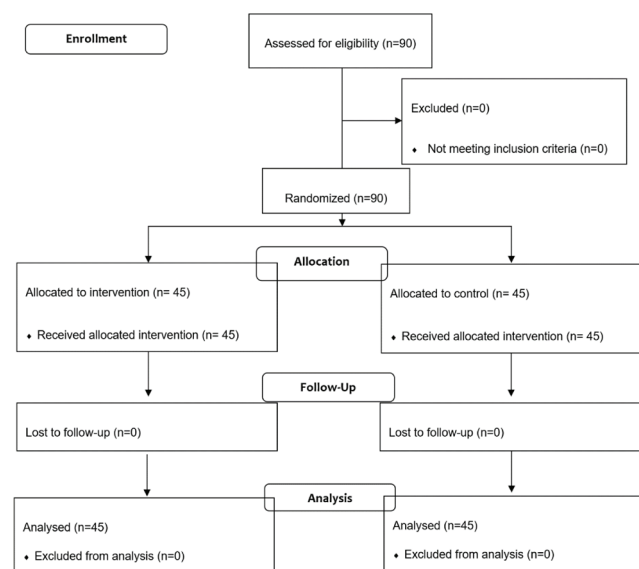


FIGURE 1. The process of the study according to the Consort flow diagram (2010)

Sample Size

The sample size was estimated using a statistical power analysis with the consideration of $\alpha = 0.05$, $\beta = 15\%$, power = 90%, Altman's Nomogram, and also the sample size of a previous study.⁽²³⁾

Measurement Tools

Data was collected using the following instruments:

- Personal and medical data form: It contained questions regarding demographic characteristics of the older people including age, the marital status, education level, employment status, living status, and history of hospitalization.
- Abbreviated mental test (AMT): It helped with the assessment of older people in terms of the presence of cognitive disorders and a score greater than 7 was considered the normal status. A score lower than 7 out of 10 indicated cognitive impairments.⁽²⁴⁾ For reliability, the Cronbach's alpha coefficient of the AMT was 0.76.⁽²⁵⁾
- Hospital depression and anxiety scale (HADS): It evaluated hospital anxiety and depression levels and was consisted of 14 items, including 7 items for each subscale of anxiety (HADS-A) and depression (HADS-D). As a self-rating scale, its scoring system ranged from the absence of symptoms (score 0) to the maximal presentation of symptoms (score 3); a higher score indicated a higher level of anxiety or depression.⁽²⁶⁾ Correlations between the two subscales varied from 0.40 to 0.74, with a mean score of 0.56. The Cronbach's alpha coefficient of the HADS-A varied from 0.68 to 0.93 with a mean score of 0.83, but the Cronbach's alpha coefficient of the HADS-D was 0.67 to 0.90, with a mean score of 0.82.⁽²⁷⁾ Reliability and validity of the Farsi version of the HADS were confirmed.⁽²⁸⁾ This scale has been used for patients with heart diseases in a previous study.⁽²⁹⁾ A cut-off score greater than 8 for the diagnosis of either anxiety or depression has been suggested.⁽³⁰⁾ The quantitative score of both subscales ranged from 0 to 21 under the categorization of normal (0-7), borderline (8-10), and abnormal (11-21). A higher score indicated a higher level of anxiety or depression. Scores 11 or higher on the anxiety or depression subscales indicated the probability of either anxiety or depression disorder.⁽²⁶⁾

Intervention

The foot reflexology massage intervention was performed by the first researcher (TB) as a qualified therapist, who successfully passed required training courses on reflexology massage.

In the morning work shifts, beside the routine care in the CCU, the researcher implemented foot

reflexology massage for each participant in the intervention group, after which their baseline hospital anxiety and depression were measured. The participants were placed on a bed in the supine position and a pillow was placed under their knees. The researcher sat at the bottom of the bed and rubbed the palmar surfaces of her hands against each other to make them warm. Next, the dorsal and the plantar surfaces of one foot were lubricated using sweet almond oil and were massaged. After general foot massage, relaxing techniques were performed including effleurage movements (10 times), stretching fingers by holding them between thumbs and other fingers (5 times in both directions), and moderate rotational movements around the ankle (5 times). Next, the reflex zones of solar plexus, pituitary gland, brain, heart, large and small intestines, vertebral column, adrenal, and kidney were used for the stimulation. The researcher exerted firm downward pressure with her thumbs in the above-mentioned areas for 14 secs in the heart area, 5 times for each intestine, and 5 times for the adrenal gland and kidney. The rubbing technique was used for adrenal and kidney reflex zones. In total, reflexology massage of both feet lasted for a total of 20 min (10 min for each foot). The participants were asked to complete the HADS before and after the intervention.

After the assessment of hospital anxiety and depression in the control group, at the same time as the reflexology group (i.e., in the morning shift and in the same environment), the control group only received routine care without foot reflexology massage. Routine care included hemodynamic measurements, drug therapy, physicians' visit, and nursing care performed for patients admitted to the CCU. It should be noted that nursing duties and staffing patterns remained unchanged throughout the study process. Also, nursing staff and the participants' family members were requested not to enter the intervention room, so as to minimize disruptions and enhance the participants' relaxation. No harm or side effects were reported throughout the trial.

Randomization

Following receipt of the ethical committee's approval and the permission to enter the research zone, the head nurse of the CCU was informed of the study's aim and process. She helped with identification of eligible participants based on the inclusion criteria. Allocation of the participants to the groups happened during the week that the researchers visited the hospital. A system of sealed envelopes was used for the random assignment of the eligible participants into the groups, with each envelope assigned to a specific group. The sampling process continued until a sufficient number of the participants were assigned to each group. The second author (NR) generated the random allocation sequence, while the first author

(TB) enrolled the subjects and assigned them to the intervention and control groups. It was impossible to blind the participants or nursing staff to the group assignment due to nature of the intervention. However, the data analyst (SDT) was unaware of the group assignment. In addition, the randomization codes were available only to a research fellow who was not connected to this study, and were disclosed after data analysis.

Data Analysis

Data analysis was performed using descriptive (frequency, percentage, mean, and standard deviation) and inferential (independent *t* test, Chi-square test, Fisher's exact test, 2×2 repeated measure ANOVA, Eta correlation ratio) statistics via the SPSS version 21.0 software (SPSS Inc., Chicago, IL). The Kolmogorov-Smirnov test was used to assess data in terms of normal distribution. $P < .05$ was considered statistically significant.

Ethics Statement

The first author explained the study's aim and process to the eligible participants and ensured them about confidentiality of data and safety of the intervention. Each participant signed a written informed consent form. The institutional review board approval was granted by the University in which the second author worked. The ethical considerations of this study conformed to the Declaration of Helsinki 1995, revised 2001. Numbers, rather than names, were used to de-identify the participants to ensure their confidentiality and anonymity. However, a cardiologist was available in the CCU to intervene, if required. No patient withdrew from the study and no adverse effects were identified as occurring throughout the study.

RESULTS

Demographic Characteristics of the Participants

No statistically significant differences between the groups in terms of demographic characteristics including age, the marital status, education level, employment status, living status, and history of hospitalization were reported ($p > .05$). Therefore, the groups were homogenous in terms of the above-mentioned characteristics (Table 1).

Hospital Anxiety and Depression

The mean and standard deviation of the anxiety measure of the HADS assessment changed from 13.77 ± 4.39 (before the intervention) to 8.53 ± 3.70 (after the intervention) in the intervention group, and from

TABLE 1. Demographic Characteristics of the Participants (n=45 in each group)

Characteristics	Control		Intervention		Test	P value ^a
	M	SD	M	SD		
Age	72.62	7.93	72.86	7.98	Independent samples test $t=-.14$.88
Marital status, n (%)					Fisher's exact test	.13
Married	15(16.7%)		12(13.3%)			
Widow	30(33.3%)		33(36.7%)			
Education level, n (%)					Chi-square $\chi^2=4.02$ Df=2	.13
Illiterate	30(33.3%)		38(42.2%)			
Primary	12(13.3%)		5(5.6%)			
Diploma	3(3.33%)		2(2.2%)			
Employment status, n (%)					Chi-square $\chi^2=3.19$ Df=2	.20
Housewife	35(38.9%)		32(35.5%)			
Retired	2(2.2%)		7(7.8%)			
Disable	8(8.9%)		6(6.7%)			
Living status, n (%)					Chi-square $\chi^2=0.96$ Df=2	.31
Alone	19(21.1%)		23(25.6%)			
With spouse	15(16.7%)		11(12.2%)			
With child	11(12.2%)		11(12.2%)			
History of hospitalization, n (%)					Fisher's exact test	.39
Yes	37(41.1%)		32(35.5%)			
No	8(8.9%)		13(14.5%)			

^aP value was calculated using the independent *t* test, Chi-square test, and Fisher's exact test for group comparisons. The data were normal according to the Kolmogorov-Smirnov test ($p > .5$). M = mean; SD = standard deviation.

11.66 ± 4.24 to 11.06 ± 3.19 in the control group. The analysis of two-way repeated measures ANOVA revealed an interaction for the outcome measure anxiety indicating that foot reflexology massage significantly decreased anxiety relative to the control intervention ($F(1.44)=19.11, p = .001$). Also the eta ratio showed a correlation between foot reflexology massage and anxiety ($\eta^2=.39$) and the intervention had a large effect on the anxiety level (Table 2). The main effect of treatment group assignment was not significant for anxiety ($F(1.44) = 0.10, p = .74$), but there was a main effect for time ($F(1.44) = 28.08, p = .001$).

The mean and standard deviation of the depression measure of the HADS assessment changed from 13.66 ± 4.64 (before the intervention) to 8.44 ± 3.66 (after the intervention) in the intervention group, and from 11.93 ± 4.30 to 11.11 ± 3.42 in the control group. Regarding the level of depression, the two-way RM-ANOVA detected a statistically significant interaction between the groups indicating that foot reflexology massage reduced depression ($F(1.44) = 16.76, p = .001$). Moreover, the eta ratio showed a correlation between the intervention and depression ($\eta^2=.27$).

TABLE 2. Comparison of Mean Scores of Hospital Anxiety and Depression Before and After the Intervention

	Before Intervention	After Intervention	Statistical Analysis of the Intervention
Hospital. Anxiety Control	11.66±4.24	11.06±3.19	$F(1.44) = 19.11, p = .001$
Intervention	13.77±4.39	8.53±3.71	
Hospital. Depression Control	11.74±4.29	11.11±3.42	$F(1.44) = 16.76, p = .001$
Intervention	13.66±4.64	8.42±3.62	

Data are presented as means ± SD.

signifying that foot reflexology massage had a large effect on the depression level (Table 2). The main effect of group was not significant for depression ($F(1.44) = 0.28, p = .59$), but there was a main effect of time ($F(1.44) = 16.76, p = .001$).

DISCUSSION

In this study, foot reflexology massage reduced anxiety and depression in the older women with ACS. The levels of hospital anxiety and depression in the intervention group significantly decreased compared to that of the control group.

As a non-pharmacological intervention, foot reflexology massage is an effective therapy. For instance, according to Soheili et al.,⁽²⁰⁾ reflexology helped with alleviating anxiety and depression in women with multiple sclerosis. The results of the present study were in line with the findings of the study by Moghimi Hanjani et al.⁽³¹⁾ indicating the effect of foot reflexology massage on the reduction of anxiety and depression in primigravida women. Similarly, Shahsavari et al.⁽³²⁾ also investigated the effect of foot reflexology massage on anxiety and physiological parameters among bronchoscopy candidates using the massage on pituitary, solar plexus, heart, and lung reflex points. They found that foot reflexology alleviated patients' anxiety and improved their physiological parameters. Also, the study by Mortazavi et al.⁽³³⁾ showed higher symptom improvements after massage in subjects during labor. Conversely, Hudson et al.⁽³⁴⁾ reported that reflexology did not significantly increase the study outcomes in patients undergoing minimally invasive surgeries and local anesthesia. A probable reason for variations in the results of studies could be methodological differences, including sampling and the intervention process.

It is believed that reflexology helps body systems return to the natural state and reduce symptoms of a disease.⁽³⁵⁾ Also, reflexology can affect psychological indicators more than biometric parameters.⁽³⁶⁾ Physiological changes, such as the increased blood

circulation and muscle relaxation, are the main consequences of reflexology massage that improve patient's comfort.⁽³⁷⁾

Inconsistencies in maps and points used for reflexology massage are considered major interventional problems for patients with cardiac diseases,⁽³⁸⁾ which may explain reasons for differences in the results of the Gunnarsdottir and Jonsdottir's study⁽²¹⁾ with those of the present study. Williamson et al.⁽³⁹⁾ showed that foot reflexology massage was not more effective than non-specific foot massage for relieving psychological symptoms during menopause. Differences in techniques used for reflexology, and number and length of reflexology sessions, could account for differences in the results.

Study Limitation

The examination of baseline anxiety between the groups indicated some differences, which could be caused by the small sample size in this study. However, the groups were homogenous in other characteristics. Also, the long-term assessment and follow-up of anxiety and depression in the older women after reflexology massage were not conducted due to a lack of feasibility.

Recommendation for Further Research

Future studies with a larger sample size and long-term follow-up are needed to examine the effect of foot reflexology massage on psychological parameters in cardiac patients. Moreover, the usefulness of alternative and complementary techniques in older adults needs further studies.

CONCLUSION

Foot reflexology massage is an efficient and safe intervention for alleviating psychological responses among female older adults suffering from ACS. Therefore, this safe and non-pharmacological intervention can be used, along with pharmacological measures, to reduce psychological symptoms and improve quality of care in patients with ACS.

ACKNOWLEDGMENTS

This research was supported financially by a grant from Shahed University, Tehran, Iran (decree code: P/A/13/93). Ethical approval was given by the ethics committee of Shahed University (No. 41-228111).

CONFLICT OF INTEREST NOTIFICATION

The authors declare there are no conflicts of interest.

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